			Forestry **Grades 11-12** **Unit #1**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Tree Identification**	**Suggested Timeline:** 2 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Tree Identification
Unit Summary	During this unit, students will learn about the various tree species grown in Pennsylvania. Students will practice using a dichotomous key to identify tree species. They will then select tree types and become an "expert" in identifying trees local to York County.

Unit Essential Questions:	**Key Understandings:**
1. Why is it critical to know how to identify trees?	1. Identifying trees by leaves 2. Identifying trees by bark 3. Identifying trees by wood

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:

Misconceptions:	**Proper Conceptions:**
1. To be an evergreen tree, it must contain needles.	1. There are different types of evergreen trees and shrubs and they all do not contain needles.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Distinguishing features of bark, leaves, and twigs useful to identify trees. ● Fifty common trees found in York County.	● Identifying common tree species by bark, leaves, and twigs. ● Identifying trees by alternative means such as flowers, seeds, and other features. ● Using dichotomous key and/or field guide to identify unknown trees.	● Learning to Learn

Academic Vocabulary:

● Conifer ● Bundle ● Scaly ● Petiole ● Leaf Base ● Leaf Scar	● Broadleaf ● Alternate Branching ● Opposite Branching ● Lobe ● Compound Leaf ● Node	● Leaf Margin ● Entire ● Toothed ● Sinus ● Simple Leaf

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Biology

Additional Resources:

- Dichotomous key
- Field Guides

- Power Points
- www.paffa.org

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #2**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Timber Cruising**	**Suggested Timeline:** 3 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Timber Cruising
Unit Summary	Students will learn the basics of, timber cruising which involves walking or "cruising" a forest in order to measure the trees and collect other information about the forest. Timber cruising is usually done by a small crew. Students will use the detailed data collected to create a forest inventory.

Unit Essential Questions:	**Key Understandings:**
1. What is the purpose of establishing timber plots? 2. How do I compute acreage? 3. How do I determine the classification of a particular site? 4. How do I construct a map of a surveyed area? 5. Why are land surveys important in forestry? 6. How do I cruise a stand of timber? 7. How do I mark timber for various purposes? 8. How do I calculate tree volume and its economic value?	1. Maintaining a healthy forest 2. Calculating the worth of standing timber 3. Managing a forest

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.

NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	
ESS.01.02.01.b.	Demonstrate the proper use and maintenance of basic laboratory equipment.
ESS.01.01.01.b.	Determine the appropriate sampling techniques needed to generate data.

Misconceptions:	**Proper Conceptions:**
1. You can only get an accurate measurement of board footage on a stand of timber by cutting it.	1. Using measuring devices properly, you can obtain a good record of how much timber is in a stand.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Rationale for delineating and identifying timber stands. ● Factors to consider when identifying a timber stand. ● Common conversion factors used to computer acreage, such as: ft2/acre, ft2/yd2, yd2/acre, acres/mile2, etc. ● Distinguishing characteristics of sites in Class I-V. ● Purposes of using random vs. systematic sampling in forestry. ● Common conversion factors used in forestry surveying, such as: ft/chain, chains/acre, etc. ● Features of two types of land surveys used in the United States. ● The relationship of baselines and principal meridians to the initial point location from which each rectangular survey begins. ● The purposes of both fixed and variable timber plots. ● Tools commonly used to estimate the diameter and height of a standing tree. ● The role of a timber cruiser. ● The differences between a 100% cruise and a partial cruise and when it is appropriate to use each. ● Assumptions that apply to partial cruises and how they affect the accuracy of the results. ● Visual indicators of tree age, including exterior and interior indicators.	● Laying out sample plots of 1/10 and 1/4 acre. ● Calculating area measured in printed maps and surveys. ● Calculating area from digital map resources. ● Systematically sampling plots of trees within a timber stand. ● Marking boundaries and corners using paint and tree blazes. ● Conducting linear measurements using a surveyor's chain. ● Conducting linear measurements by pacing. ● Conducting linear measurements using a land wheel. ● Clearing brush for survey. ● Using a compass to maintain direction of survey. ● Using surveyor's pins to mark temporary corners. ● Using a compass and pacing to establish plots and direct cruising operations. ● Using tree tape, flags, paint, and a marking gun to identify trees. ● Using a timber tally book. ● Recording the number of trees by species, diameter, and height. ● Measuring tree heights using a cruising stick. ● Measuring tree heights at diameter breast height (DBH) using a cruising stick.	● Learning to learn

• The most commonly used methods for scaling logs. • Common resources and methods used to calculate the value of timber stands based off of inventory volume data.	• Measuring tree heights at DBH using a diameter tape, a caliper, and a Biltmore stick. • Calculating board foot volume of individual trees and the total stand using: International, Doyle, and Scribner rules. • Calculating volume of pulpwood using volume tables.	

Academic Vocabulary:

• Timber cruising • Forest Inventory • Sampling	• Fixed area sampling • Point Sampling • Calipers	• Logger's tapes • Biltmore Stick

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Math

Additional Resources:

- Tools for labs
- Powerpoints
- www.paffa.org

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #3**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Christmas Tree Production**	**Suggested Timeline:** 1 week

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Forestry Products I; Christmas Tree Production
Unit Summary	During this unit, students will gain knowledge of Christmas tree production in Pennsylvania. Students will learn about the varieties grown and harvested. This unit will teach how to care for and market Christmas trees in the fresh and balled and burlap markets.

Unit Essential Questions:	**Key Understandings:**
1. How do I determine which species of tree is best for Christmas tree production? 2. How do I plant and care for Christmas trees? 3. How do I harvest and market Christmas trees?	1. Christmas tree varieties 2. Managing Christmas Trees 3. Harvesting Christmas Trees 4. Marketing Christmas Trees

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	

Misconceptions:	Proper Conceptions:
1. Christmas trees are only grown for the fresh tree market.	1. Christmas trees are sold year round in both fresh cut and balled and burlap markets.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● The economic importance of Christmas trees as an alternative crop in Pennsylvania and the United States. ● The species of trees best suited for local production and consumer demands. ● The best time and place to plant trees based on local site conditions, topography, climate, and market access. ● Best managements practices for nutritional and health requirements of growing trees. ● Best management practices for the implementation of an Integrated Pest Management (IPM) program. ● Common diseases, insects, and wildlife pests of Christmas trees. ● When and how to shear, shape, and trim trees based on tree species and market factors. ● When to harvest trees based on market trends and weather. ● How to best market Christmas trees to maximize profit margins.	● Selecting the best-suited tree species for soil, topography, climate, and other site factors. ● Inspecting and caring for tree stock before planting. ● Calculating the population of trees to be planted and spacing requirements between individuals and rows based on species and sit conditions. ● Laying out rows using stakes and cord. ● Calculating fertilizer requirements based on tree species and soil tests. ● Brush and weed control with chemical and mechanical best practices. ● Use and maintenance of back-pack compression sprayers. ● Shearing, shaping, and trimming trees. ● Maintaining and using shearing tools. ● Harvesting trees using specialized tools and equipment. ● Selecting, marking, cutting, and pricing trees according to species, density, height, and market demands.	● Persistence ● Adaptability

Academic Vocabulary:		
● Baler ● Prune ● Shears	● Douglas Fir ● White Pine ● Fraiser Fir	● Evergreen ● Blue Spruce ● Norway Spruce

Assessments:
● Quizzes ● Test ● Projects ● Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Science

Additional Resources:

- Powerpoints
- PA Christmas Tree Marketing Board

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #4**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Forest Safety and Equipment Operations**	**Suggested Timeline:** 1 week

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Forest Safety and Equipment Operations
Unit Summary	Students will learn basic safety of chainsaw operations and proper usage of personal protection equipment. Students will gain an understanding of how to work safely in a forest and how to properly select the correct tools for forestry jobs.

Unit Essential Questions:	**Key Understandings:**
1. How do I safely operate a chainsaw? 2. Why do I need to use PPE? 3. How do I properly maintain a chainsaw? 4. How do I select the right hand tools for the task at hand?	1. Chainsaw safety 2. Personal Protective Equipment 3. Tool Selection

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.

NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	

Misconceptions:	**Proper Conceptions:**
1. Dull chainsaw blades are safer than sharp ones.	1. A dull chainsaw can cause more hazards than a sharp chainsaw.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Safety practices that contribute to the safe operation of a chainsaw. ● Parts and functions of parts necessary to operate a chainsaw. ● Types of clothing and personal protective equipment that provides for safety in the forest industry. ● How training contributes to the safety of workers in the forest industry. ● How high-quality and well-maintained tools and equipment contribute to the safety of forest industry workers. ● Work habits that contribute to worker safety when working in the forest industry.	● Safely operating a chainsaw. ● Mixing fuel and oil in proper proportion. ● Clean saw and prepare for storage. ● Demonstrating the safe and proper use of a chainsaw. ● Selecting and wearing proper clothing and PPE, such as: hardhats, gloves, safety shoes, chaps, ear protection, and safety glasses. ● Sharpening a chain with a file and chain grinder. ● Replacing a chain sprocket or chain clutch as needed. ● Maintaining the chain bar. ● Clean and regap spark plug. ● Clean and service carburetor air cleaner. ● Adjust carburetor for maximum efficiency. ● Differentiating between various forestry hand tools. ● Safely using of various forestry hand tools, including: hand saw, hatchet, maul, axe, and cant hook.	● Responsibility

Academic Vocabulary:

● Chaps ● Hand saw ● Two man saw	● Axe ● Maul ● Cant Hook	● Lever ● Hatchet

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Science

Additional Resources:

- Powerpoints
- Chainsaw
- Chains
- Files
- Grinder

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #5**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Forestry Products II**	**Suggested Timeline:** 1 week

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Forest Products II
Unit Summary	During this unit, students will learn how to identify wood species in lumber products, lumber sizes, and the uses of lumber from hard and soft woods. Students will learn about various wood products produced in Pennsylvania and the Unites States.

Unit Essential Questions:	**Key Understandings:**
1. How are wood products utilized for construction purposes? 2. How is wood processed into specialty forest products?	1. Lumber Sizes 2. Identifying Wood Types 3. Hard Woods 4. Soft Woods 5. Wood Products

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.

NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:

Misconceptions:	**Proper Conceptions:**
1. Any type of lumber can be used for a project as long as you have the correct dimensions.	1. Different species of trees create lumber that can be used for different purposes based on its strength, hardness, and appearance.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Distinguishing characteristics that are useful in identifying woods of different species. ● Characteristics of wood that contribute to its value and detract from its value for construction purposes. ● Characteristics of hardwoods that contribute to their usefulness. ● The source and methods of processing wood veneers. ● The significance of cellulose to the fiber and paper industries. ● Different methods used to convert wood fiber to pulp. ● The importance of biomass as a fuel for generating electrical power and heat energy.	● Classifying the different cuts of wood according to their dimensions. ● Distinguishing between lumbers and timbers. ● Distinguish the differences among the different types of reconstituted boards. ● Naming the different types of products extracted from wood using solvents and explaining the processes by which they are obtained. ● Identifying wood types ●	● Learning to Learn

Academic Vocabulary:

● Biomass ● Electrical power ● Heat energy ● Hardwood	● Soft wood ● Pulp wood ● Veneer ● Cellulose	● Dimensional Lumber ● Billets ● Ash Lumber

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Science
- Math

Additional Resources:

- Powerpoints
- PA Wood Mobile Resources
- Wood Samples

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #6**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Forestry Products III**	**Suggested Timeline:** 2 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Forest Products III: Maple Syrup Production
Unit Summary	Students will learn about identifying Sugar, Red, and Norway maples. Students will gain skills to collect sap from the trees and then process it into syrup. Students will also learn about marketing maple syrup.

Unit Essential Questions:	**Key Understandings:**
1. How do trees produce maple sap? 2. How do I obtain maple sap from a tree? 3. How do I produce and market maple syrup?	1. Sap Production 2. Maple Syrup Industry 3. Maple Syrup Grades 4. Sap Collection

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	

Misconceptions:	Proper Conceptions:
1. The collection of sap from the tree is the syrup.	1. It takes several gallons of sap boiled down to produce one gallon of syrup.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● The anatomy and physiology of trees that provides for sap production. ● The early history and current status of the maple syrup industry. ● Seasonal and weather conditions necessary to produce a run of maple sap. ● Equipment needed to collect maple sap with keeler and tube methods. ● Procedures for selecting equipment, sanitizing, and tapping trees. ● Food safety procedures for producing maple syrup. ● Best practices and procedures for boiling maple sap into syrup. ● USDA grades for maple syrup.	● Identifying sugar, red, silver, and Norway maples. ● Selecting appropriate maple trees to be tapped. ● Selecting the number of taps for each tree. ● Tapping trees and sanitizing holes. ● Collecting and storing sap for processing. ● Boiling maple sap into maple syrup. ● Processing maple syrup and packaging maple products for market. ● Grading, pricing, and marketing maple products.	● Curiosity

Academic Vocabulary:		
● Sap Production ● Keeler ● Tube	● Sugar Maple ● Red Maple ● Norway Maple	● Tap ● Spile

Assessments:
● Quizzes ● Test ● Projects ● Class participation and practices

Differentiation:
● Book work ● Lecture ● Demonstrations ● Video clips ● Hands on learning ● IEP accommodations

Interdisciplinary Connections:

- Culinary

Additional Resources:

- Buckets
- Taps
- Tubing
- Powerpoints
- Videos

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #7**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Forest Ecology and Sivilcuture**	**Suggested Timeline:** 3 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Forest Ecology and Sivilculture
Unit Summary	Students will learn about the importance of forest health through soil, water, and a healthy ecosystem. Students will gain knowledge in sivilculture and important management practices used. Students will focus on forest regeneration and the different growth stages of a forest.

Unit Essential Questions:	**Key Understandings:**
1. How does the health of a forest depend on ecology? 2. Why do foresters plant trees and study sivilculture?	1. Soil and Water Health 2. Growth Stages of a Forest 3. Ecosystems 4. Sivilculture management practices

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.

NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	

Misconceptions:	**Proper Conceptions:**
1. Cutting timber is bad for the forest.	1. Forests need managed to provide maximum growth and to function well within the ecosystem. Cutting timber actually provides a better environment for wildlife.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● How natural cycles function to prevent pollution and renew the environment. ● The importance of the element carbon to living organisms. ● How soil and water influence forest health. ● The relationships among forests, soil, air, water, and wildlife. ● What sivilculture is and be able to define important sivilcultural management practices. ● The most common methods of producing seedlings for forest regeneration. ● The different growth stages of trees, such as: seedling, sapling, pole, and mature. ● Sivicultural practices used to improve the growth and quality of trees. ● How the final use of a tree affects harvesting method.	● Planting trees using a tree bar or mattock. ● Prepare a planting site by scalping sod. ● Prepare a plating site by plowing or disc-ing. ● Prepare a planting site with herbicide.	● Decision Making

Academic Vocabulary:

● Tree Bar	● Herbicide	● Fungicide
● Mattock	● Sivilculture	● Sapling
● Scalping Sod	● Seedling	● Pole

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Science

Additional Resources:

- Videos
- Powerpoints
- PA Wood Mobile Resources

Created By: Meagan Smyers

			Forestry **Grades 11-12** **Unit #8**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Timber Harvesting and Fire Prevention**	**Suggested Timeline:** 2 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Timber Harvesting and Fire Prevention
Unit Summary	During this unit, students will be learning the best management practices for harvesting timber. This will include safety practices for working around forestry equipment, processes and operation of forestry equipment and decision making that affects timber harvesting. Students will also learn about forest fires, how to prevent them, and how to manage a forest fire.

Unit Essential Questions:	**Key Understandings:**
1. How do I utilize safe logging practices to harvest timber? 2. How and when do I fell a tree? 3. Why are trees limbed and bucked? 4. How do I prevent forest fires?	1. Safe Logging Practices 2. Felling Trees 3. Forest Fires

Focus Standards Addressed in the Unit:

Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.

NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:	

Misconceptions:	**Proper Conceptions:**
1. Forest fires are bad for the forest.	1. Forest fires are necessary to maintain a healthy forest.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Best management practices for harvesting timber. ● Safety practices for working around heavy forestry equipment. ● The processes and operations of heavy forestry equipment, including: skidders, winches, chokers, and loaders. ● Factors that influence decisions affecting timber harvests. ● The critical components of a timber harvest plan. ● How the planned method of forest regeneration affects the selection of a harvest method. ● The steps involved in harvesting timber. ● How fire behaves according to wind direction. ● How fire behaves when affected by weather, topography and vegetation. ● How to control a fire using hand tools. ● How to use hand tools to construct fire lines and clear ground litter.	● Establishing a log landing area within a forestry site. ● Planning the felling, skidding, piling, loading, and transporting of logs away from a forestry site. ● Notching trees properly to control the fall of the tree and to avoid splitting trunks. ● Felling trees. ● Avoiding damage to timber not marked for cutting. ● Cutting a tract according to the forestry site plan. ● Planning a harvest to minimize erosion and site damage. ● Limbing trees. ● Bucking trees according to mill and site plan specifications. ● Utilizing safe fire prevention practices when using forests for recreational purposes.	● Curiosity

Academic Vocabulary:

● Log Landing ● Felling ● Skidding ● Notching	● Bucking ● Limbing ● Tract ● Winch	● Choker ● Regeneration ● Topography

Assessments:

- Quizzes
- Test
- Projects

- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- Science

Additional Resources:

- Powerpoints
- Videos
- Worksheets
- PA Wood Mobile Resources

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			Forestry **Grades 11-12** **Unit #9**
Course/Subject: Forestry/ Agriculture	**Grade:** 11-12	**Arboriculture**	**Suggested Timeline:** 2 weeks

Grade Level Summary	This course will focus on the science and management of trees as a natural resource. Topics of study include: tree biology, tree identification, tree production, forest management, forestry products, and forestry equipment. Students will work outside, in the lab, and in the greenhouse to identify the most common trees in Pennsylvania, measure trees, calculate the value of a timber stand, develop plans to manage existing stands of trees, and safely use basic forestry equipment to care for trees. All students are FFA members through this course.
Grade Level Units	Unit 1: Tree Identification Unit 2: Tree Cruising Unit 3: Forest Products I; Christmas Tree Production Unit 4: Forest Safety and Equipment Operations Unit 5: Forest Products II Unit 6: Forest Products III Maple Syrup production Unit 7: Forest Ecology and Sivilculture Unit 8: Timber Harvesting and Fire Prevention Unit 9: Arboriculture

Unit Title	Arboriculture
Unit Summary	This unit will focus on the practice of arboriculture. Students will study the way woody plants grow and respond to the environment around them. Students will have the skills to maintain woody plants based on their species, common ailments, and environmental surroundings.

Unit Essential Questions:	**Key Understandings:**
1. How do I safely and properly prune trees? 2. How do I maintain healthy trees?	1. Pruning trees 2. Tree Health 3. Tree Disorders

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.
NRS.02.	Analyze the interrelationships between natural resources and humans.
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources.
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

Important Standards Addressed in the Unit:

Misconceptions:	**Proper Conceptions:**
1. Once a tree is diseased, you will have to cut it down.	1. There are methods to correcting disease and even poor growth to save a tree from being cut.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● The best times to prune based on tree species, purpose, individual tree, and seasonality. ● Sustainable strategies to remove and properly dispose of limbs from pruning. ● Why it is important to prune trees, trim, and cull tree. ● Common tree disorders in the United States. ● A systematic approach to diagnosing problems in trees. ● How cables and other hardware items are used to stabilize and repair damaged trees. ● The differences between the Plant Health Care (PHC) system for managing trees and traditional methods of management.	● Coiling and storing ropes properly. ● Selecting, using, and storing tree saddles and tree harnesses properly. ● Making a monkey's paw and throwing rope. ● Tying eight common knots. ● Climbing trees using tree ropes. ● Using safety straps and taut-line hitches. ● Removing limbs using a pruning saw. ● Removing limbs using a pole saw and pole loppers. ● Treating pruning wounds with tree wound dressing. ● Cleaning tree cavities with mallet and chisel. ● Filling cavities with mortar mix. ● Controlling insects and disease using Integrated Pest Management (IPM). ● Fertilizing according to soil tests.	● Curiosity

Academic Vocabulary:

● Pruning ● Trimming ● Culling ● Square Knot ● Slip Knot ● Rolling Hitch	● Tree saddles ● Tree Harness ● Monkey's Paw ● IPM ● Clove hitch ● Taut Line Hitch	● Pole Saw ● Pole Lopper ● Wound dressing ● Mortar mix ● Half Hitch

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:
- Science

Additional Resources:
- Powerpoints
- Rope
- Vidoes

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